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IDAHO DEPARTMENT OF HEALTH & WELFARE

Bureau of Community and Environmental Health

Past Lead Exposure and Renal Disease

Information for Health Care Providers

What is the relationship between past lead exposure and renal disease?

Studies show a strong association between lead exposure and renal effects, especially in acute and chronic high-dose exposures. Effects resulting from acute high exposure may be reversible, but damage to nephrons from chronic lead exposure or renal disease is considered permanent. Several factors may contribute to the increased risk of renal disease in lead exposed individuals:

- The extra burden placed on remaining nephrons as a result of damaged nephrons and a diminished renal reserve for handling normal aging changes or further renal insults.
- The release of bone-stored lead which can cause re-exposure to the kidney.
- The higher risk for and/or interaction with comorbid conditions, such as hypertension or diabetes.
- The association between lead exposure, renal disease and saturnine gout.
- Possible additional past exposure to other nephrotoxic metals, particularly cadmium.

Chronic renal failure and end-stage renal disease (ESRD) are relatively rare, but have a severe individual and public health impact. Renal disease resulting from lead exposure at first presents as an interstitial nephritis with little albuminuria compared to glomerular disease. However, over time it proceeds similarly to, and may be indistinguishable from, renal disease from other causes. Kidney disease progresses slowly and consequently the connection to the original lead exposure may not always be made.

What should I know about screening for renal disease?

The tests available for kidney function (blood urea nitrogen [BUN] and serum creatinine) are unable to measure damage until kidney function is down to 1/2 to 1/3 of normal. Measuring serial serum creatinine levels over time or calculated creatinine clearance changes could be other testing options. More sensitive and earlier indicators are being investigated, including renal urinary biomarkers.

Usually by the time renal disease has been diagnosed, substantial renal function has already been lost and cannot be recovered. Nevertheless, there are actions that can be taken to protect the kidneys or slow further deterioration (see box below).

Renal disease and other diseases

The two major causes of renal disease are hypertension and diabetes. Health care providers should treat these conditions aggressively and encourage the highest possible level of patient compliance, especially among lead-exposed populations.

Hypertension and renal disease have a complex interaction. Each disease can contribute to the development or progression of the other, but lines of causation remain unclear.

What can I do to protect renal function in my at-risk patients?

- Be aware of the increased risks in the target population and be vigilant for renal disease and other lead-related health conditions.
- Educate patients on how to avoid further insults to the kidneys.
- Aggressively treat comorbid conditions such as diabetes and hypertension. Be aware that recommended drug treatment for hypertension may differ in the presence of renal disease.
- Bone protective measures are strongly advised to prevent the remobilization of bone-stored lead during calcium stress.
- Consider recommending a low-protein diet in patients with renal disease.
- Advise patients to avoid excess salt; tobacco use (high in cadmium); and excess intake of NSAIDS, acetaminophen, and other nephrotoxic substances.

Bureau of Community and Environmental Health (BCEH)
Environmental Health Education and Assessment
450 W. State St. 6th Floor, Boise, Idaho 83720-0036
Toll Free: 1-866-240-3553
(208) 334-5927
BCEH@idhw.state.id.us